

TAXONOMY OF THE TYPICAL SUBGENUS ODYNERUS IN NORTH AMERICA

(Hymenoptera, Vesidæ)

BY RICHARD M. BOHART

University of California, Los Angeles

Since the publications by S. A. Rohwer on *Odynerus*, this large and systematically complex genus has been relatively neglected in America. The excellent work of J. Bequaert constitutes an outstanding exception to this statement, but his papers lay emphasis more on the eastern than on the western species.

The author recently had the opportunity of studying the more important collections of *Odynerus* in this country, and this paper is the first of a series to be published on the genus.

Acknowledgment is gratefully made to the U. S. National Museum, California Academy of Sciences, Washington State College, and Joseph Bequaert for the loan of material used in this study.

ODYNERUS Latreille, sensu stricto

Odynerus Latreille, 1802. Hist. Nat. Crust. Ins., 3:362.

Epipone Kirby and Spence, 1818. Intr. Ent., 1:34.

Oplopus Wesmael, 1836. Bull. Acad. Sci. Belg., 3:45.

Oplomerus Westwood, 1840. Intro. Mod. Class Ins., Synopsis, 2:84.

Hoplomerus C. G. Thomson, 1874. Skandinaviens Hymenoptera 3(1):35, 41.

Type: *Vespa spinipes* Linneus, 1758.

The typical subgenus *Odynerus* is abundant in the Palearctic realm but is represented in North America by only a few rare species found in Canada and western United States. Some of these, however, are among the most bizarrely colored members of the genus. *Odynerus sensu stricto* is not easily separable from the subgenus *Rygchium*, as many intermediate forms exist. Two North American species which fall in this category are *aldrichi* Fox and *morelius* Sauss. (= *nigrohirsutus* Cameron and *canamexicus* Rohwer). On the basis of the character of the front face of the pronotum, however, *aldrichi* can be retained in *Odynerus sensu stricto* while *morelius* falls in *Rygchium*. To the author's knowledge, the characters of the front face of the pronotum in eumenids have not heretofore been

recognized as of systematic value. As this area is usually obscured by the head, the latter should be pulled slightly forward and downward in the process of mounting.

The following sum of characters will distinguish the North American species of the typical subgenus as defined in this paper: Vertical front of the pronotum with faint, widely separated pits or depressions (compare figs. 13 and 14); male antennæ usually rolled apically rather than hooked; first abdominal tergite without a transverse carina at its summit; second tergite with relatively uniform puncturation and little or no subapical depression.

On the basis of the absence of a carina on the first tergite *Odynerus sensu stricto* readily can be separated from *Ancistrocerus*, *Symmorphus*, and *Alastoroides*. Furthermore, it can easily be distinguished from *Stenodynerus* (including *Parancistrocerus*) by the presence in the latter of large, deep, approximate pits on the vertical front of the pronotum (fig. 14).

KEY TO THE SUBGENUS ODYNERUS OF NORTH AMERICA

1. Mesonotum without evident notaulices; predominantly black and yellow or black and white species.....2
- Mesonotum with sharply impressed notaulices usually running the entire length of the scutum; predominantly black and bright orange-red species.....3
2. With a sharp, complete carina on the anterior margin of the dorsal surface of the pronotum; with a complete whitish band across the scutellum and postscutellum; erect hair on the horizontal surface of the first tergite less than the length of an ocellus; male antennæ hooked, hardly rolled; male mandible and clypeus as in figure 5.....*aldrichi*
- Without a complete carina on the anterior margin of the dorsal surface of the pronotum; usually male only with whitish bands across the scutellum and postscutellum; erect hair on the horizontal surface of the first tergite longer than the length of an ocellus; male antennæ greatly flattened and rolled apically; male mandible and clypeus as in figure 6; male middle femur strongly serrate.....*dilectus*
3. Pronotum with a fairly sharply rounded front margin, lateral angles bluntly pointed; red coloration on first five abdominal segments; wings in female dark brown violaceous; female vertex with two distinct postocellar pits; male middle femur with a sharp sub-basal carina bordering a shallow concavity; terminal segments of male antennæ large and well coiled; male clypeus and mandible as in figure 8.....*erythrogaster*

- Pronotum without a sharp front margin, smoothly rounded off; lateral angles of pronotum rounded off, not projecting; wings in female lightly stained with brown; depressions on female vertex almost or quite obsolete; terminal segments of male antennæ small; male middle femur without a basal concavity or ridge.....4
- 4. Dorsum of thorax completely black; first two abdominal segments (at most) with red coloration; hair on second tergite about as long basally as apically; female clypeus black; male clypeus whitish-silvered; male antennæ rolled apically.....
..... *margaretellus*
- Pronotal angles and tegulæ red-spotted; first four abdominal segments (at least) with red coloration; hair on apex of second tergite much shorter than at base; female clypeus orange-red; male antennæ not rolled apically.....*cinnabarinus*

ODYNERUS ALDRICHI Fox

(Figs. 1, 5, 9, 13)

Odynerus aldrichi Fox, 1892. Ent. News, 3:197 (type, U. S. N. M.).

Male. Black; mandible, clypeus, a line from the clypeus to emargination of eye, frontal spot, first antennal segment partly, a post-ocular spot, front margin of pronotum, tegula except a central spot, small spot on mesopleuron, complete stripe across both scutellum and postscutellum, legs for the most part, apical margins of abdominal tergites one to six, the first with a squarish attached lateral spot, and apical margin of sternites two to six, whitish; antennæ beneath and last two segments entirely, stains on femora and tarsi, anterior margins of wings, and stains on first abdominal segment, ferruginous. Body clothed with very short pubescence, clypeus not silky but almost glabrous, erect hair on horizontal portion of first tergite less than the length of an ocellus. Head and thorax coarsely, closely punctured; propodeum coarsely punctured except in the weakly striate enclosure which has definite inferior and weak exterior carinate margins; abdominal tergites with large, well separated punctures; mesoscutum without notaulices. Antennæ as in figure nine, clypeus and mandible as in figure five, genitalia as in figure one. Length to apex of second tergite, 7-9 mm.

Female. Markings as in male with following exceptions: Antennæ black, clypeus black except for two pale basal spots, mandible black except at base, first five abdominal tergites and second sternite with apical whitish bands, legs black basally, femora, tibiæ, and tarsi mostly ferruginous. Clypeus about as long as broad, weakly incised apically, latero-apical edges convex; vertex with a median semi-circular depression. Length to apex of second tergite, 9 mm.

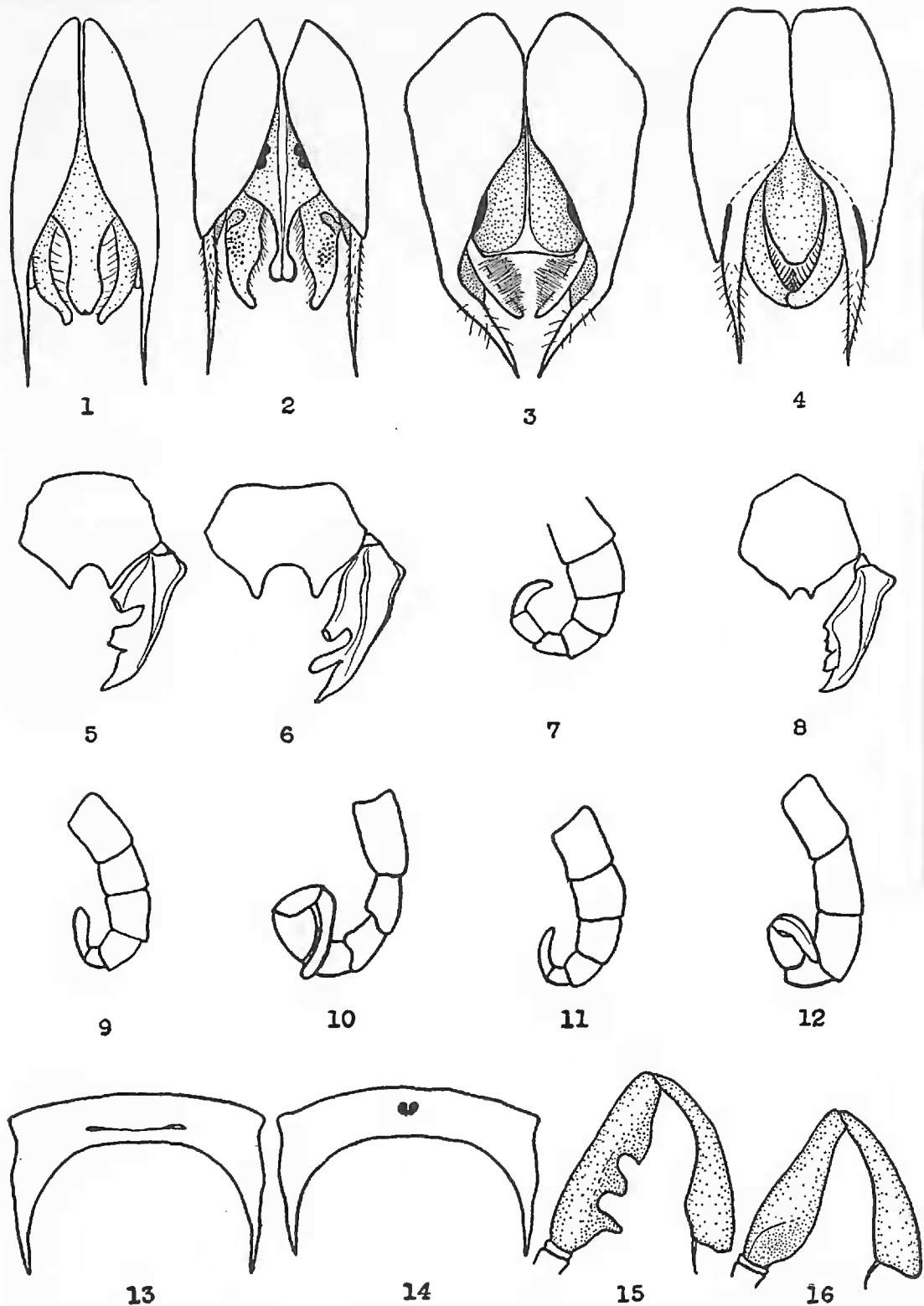


Fig. 1, *aldrichi*, male genitalia, dorsal; fig. 2, *dilectus*, male genitalia dorsal; fig. 3, *margaretellus*, male genitalia, dorsal; fig. 4, *erythrogaster*, male genitalia, dorsal; fig. 5, *aldrichi*, male clypeus and mandible; fig. 6, *dilectus*, male clypeus and mandible; fig. 7, *margaretellus*, apex of male antenna; fig. 8, *erythrogaster*, male clypeus and mandible; fig. 9, *aldrichi*, apex of male antenna; fig. 10, *dilectus*, apex of male antenna; fig. 11, *cinna-barinus*, apex of male antenna; fig. 12, *erythrogaster*, apex of male antenna; fig. 13, *aldrichi*, front face of pronotum; fig. 14, *Stenodynerus* sp., front face of pronotum; fig. 15, *dilectus*, male middle femur and tibia, lateral; fig. 16, *erythrogaster*, male middle femur and tibia, lateral.

Paratypes of this species are in the Academy of Natural Sciences at Philadelphia and at the U. S. National Museum. The data on the entire type series is Brookings, South Dakota, May and June, 1891. Additional records are as follows: One male, near Denver Glacier, Skagway, Alaska, July 1, 1923 (J. A. Kusche); three females, Grand Coulee, Washington, June, 1902; one female, Silver Bow County, Montana, August, 1937; males, Grand Teton National Park, Wyoming, July, 1937 (J. McSwain); one male, Estes Park, Colorado, July 12, 1923 (R. A. Leussler); two females, Colorado (Snow collection, University of Kansas).

O. aldrichi is readily recognized by the whitish banded scutellum and postscutellum in combination with the short pubescence on the first abdominal tergite. Specimens of a Chinese *Odynerus* in the collection of the U. S. National Museum appear to be identical with *aldrichi*. If this should prove to be the case, an earlier name may have to be used. In any event, the origin of this species in Asia and its distribution along the Rocky Mountains by way of Alaska is indicated.

ODYNERUS DILECTUS Saussure

(Figs. 2, 6, 10)

Odynerus dilectus Sauss., 1870. Rev. Mag. Zool., (2) 22:141.

Odynerus (Epiponus) dilectus Sauss., 1875. Sm. Misc. Coll., Vol. 14, 254:363.

Male. Black; mandible, clypeus, underside of antennal segments one and two, frontal spot, inner orbit below emargination of eye, postocular spot, front margin of pronotum, complete bands across scutellum and postscutellum, femora partly, tibiae mostly, tarsi at base, apical margins of first six abdominal tergites and second and third sternites, pale yellow; third to seventh segments of antenna beneath, wing veins and tarsi apically, ferruginous. Pubescence of head and thorax long, sparse, and black; upper half of clypeus sparsely pubescent; erect hairs on horizontal portion of first tergite three times as long as an ocellus; abdomen clothed with minute, appressed pubescence in addition to the erect hair on the first tergite. Head and thorax closely, moderately punctured, tending to become longitudinally striate on head below ocelli; propodeum obscurely and finely striate; abdomen minutely punctured throughout, antenna tightly coiled apically, the last segment about three times as long as wide at base; mandible three-toothed, basal tooth molar-like and followed by a deep incision (fig. 6); clypeus deeply and widely incised at apex; pronotal angles small but distinct; mesonotum without notaulices;

inferior edge of middle femur three-toothed; basal half of middle tibia strongly constricted (fig. 15); propodeum without carinae; genitalia as in figure two. Length to apex of second tergite, 7-8 mm.

Female. Markings as in male with following exceptions: Pale coloration whitish, only first four abdominal tergites banded, fourth interrupted at middle; clypeus, mandible, antenna, scutellum except for a small lateral spot, postcutellum, legs for the most part, black. Clypeus not closely but coarsely punctured, apex slightly and broadly emarginate; vertex with a well defined oblique pit behind each posterior ocellus. Length to apex of second tergite, 8 mm.

This species can be recognized at once by the extraordinary serrate middle femora of the male. The only species with which it might be confused is the European *spinipes* (Linn.). In the latter, however, the last antennal segment in the male is less than twice as long as broad at the base. Also, the basal tooth of the middle femur is more slender in the latter. Otherwise the two species are extremely similar. Specimens of *dilectus* are in the U. S. National Museum collection from New Mexico, Colorado, and Edmonton and Banff, Canada. Additional records are: Two females, Coupeville, Washington, April 30, 1898; one male, Eagle Ridge, Klamath Lake, Oregon, May 23, 1924 (C. L. Fox).

Odynerus erythrogaster Bohart, new name

(Figs. 4, 8, 12, 16)

Monobia bicolor Provancher, 1888. Add. Faune Hymen, Canada, Suppl. p. 429 (nec *Odynerus bicolor* Saussure, 1856).

Male. Black; clypeus except marginally, a post-ocular spot, and usually apical margins of first to fifth tergites, whitish yellow; lateral spot on pronotum (not always present), femora apically, tibiae and tarsi entirely, abdominal tergites one to five except the apical margins and median basal black spots on tergites one to three, sternite one partly, sternite two entirely, and sternites three and four mostly, bright orange-red; wing heavily brown-stained especially around the margins. Head, thorax, first and second abdominal sternites, first tergite and base of second, covered with erect, long, black hair; clypeus also with appressed, silvery pubescence; abdominal sternites three to six with dense, fulvous pubescence especially toward the center. Head and thorax coarsely punctured, more sparsely on thorax, becoming obsolete on posterior face of propodeum; abdomen minutely punctured. Antenna coiled

at apex, last segment less than twice as long as broad at base and strongly flattened and curved; clypeus and mandible as in figure eight. Thorax as viewed from above about one-third longer than broad; pronotum with a fairly sharply rounded front margin, lateral angles bluntly pointed; thorax flattened dorsally beginning at middle of mesoscutum; mesoscutum with well defined notaulices; middle femur with a flattened area at base (fig. 16); first abdominal sternite with a faint median basal suture; genitalia as in figure four. Length to apex of second tergite, 9-11 mm.

Female. Markings as in male with following exceptions: Clypeus entirely black, no yellowish bands margining abdominal tergites, only the first five tergites with red coloration, wings more darkly brown-stained and distinctly violaceous. Pubescence as in male except on clypeus which is without appressed pubescence. Clypeus with a sharp, straight apical truncation of moderate breadth; with an oblique foveate depression behind each posterior ocellus. Length to apex of second tergite, 9-10 mm.

This species had gone unrecognized until the type, acquired by the U. S. National Museum with the Coquillet collection, was identified by J. Bequaert as an *Odynerus*. Together with *margaretellus* and *cinnabarinus*, it forms a peculiar group of hairy, black and orange-red *Odynerus*. The red coloration is not dissimilar to that caused by overexposure to cyanide fumes but is brighter and more intense. In addition to their pubescence and coloration these three species are unique in having deeply impressed notaulices. At present *erythrogaster* is known only from southern California where it frequents the sides of dry canyons. The following records are available: One male, Coalinga, May 14, 1938 (M. Cazier); one female and two males, Los Angeles County; one female, Los Angeles County (D. W. Coquillet, holotype); one female, Soboba Springs, Riverside County, June 3, 1917 (E. P. Van Duzee); five females, Riverside, May (P. H. Timberlake); one female, Edom, Riverside County, March 14, 1937 (E. G. Linsley).

ODYNERUS MARGARETELLUS Rohwer

(Figs. 3, 7)

Odynerus margaretellus Rohwer, 1916. Proc. U. S. Nat. Mus., 49:242 (holotype, U. S. N. M.).

Male. Black; clypeus whitish yellow; femora partly, tibia and tarsi entirely, first two abdominal tergites except at base, first four sternites mostly, bright orange-red; wings moderately brown-stained around the margins. Head, thorax, and abdomen except third and following sternites clothed with long, black, erect hairs;

clypeus also silvery pubescent; third and following sternites with thick fulvous pubescence toward the center and black hair toward the sides. Head and thorax coarsely punctured, posterior face of propodeum finely punctured, hardly striate; abdomen minutely punctured. Antenna loosely coiled at apex, last segment strongly flattened and about twice as long as wide at the base; mandible obscurely five-toothed, about as in figure eight; clypeus angularly emarginate at apex, about as in figure eight. Thorax, as viewed from above, about as long as broad at the tegulæ; pronotum smoothly rounded off, lateral angles rounded off, not projecting; mesoscutum with well defined notaulices; scutellum not flattened on top, convex. Median basal suture of second abdominal sternite obsolete or absent; genitalia as in figure three, the ædeagus greatly expanded and truncate apically. Length to apex of second tergite, 8 mm.

Female. Markings as in male with the following exceptions: Clypeus black, third and following abdominal sternites black. Clypeus coarsely and sparsely punctured, clothed only with long black hairs, angularly emarginate at apex. Vertex with a tiny, almost indistinguishable, pubescent pit behind each posterior ocellus. Length to apex of second tergite, 9 mm.

The characteristic which makes this species outstanding is that at most the first two abdominal tergites are marked with red. It is easily separated from *erythrogaster* by the much darker wings and more pointed prothoracic angles of the latter. The male genitalia are also very different. Records of the species are: One female, Asotin, Washington, April 15, 1923 (V. Argo); one female, North Yakima, Washington, May 27, 1903 (Eldred Jenne); one male and one female, Klamath Falls, Oregon, May 10, 1924 (C. L. Fox); one female, Blitzen Valley, Harney County, Oregon, April 19, 1936 (S. G. Jewett); type series, one female and two males, Troublesome, Colorado, altitude 7,345 feet, June 8, 1908 (S. A. Rohwer).

Odynerus cinnabarinus Bohart, new species

(Fig. 11)

Male. Black; clypeus yellowish; a small postocular spot, a large spot laterally at the pronotal angle, tegula, femora mostly, tibiæ and tarsi entirely, and first five abdominal segments except for basal black spots at the middle of tergites one to three, bright orange-red. Wings slightly stained with brown especially around the margins. Head, thorax, and first abdominal segment sparsely covered with long black hair; black hair on second and following tergites averaging only about two and one-half ocellus lengths, that on second sternite longer; third and following sternites very

sparsely covered with black hair but with thick golden pile toward the middle; clypeus, in addition to black hair, with thick yellowish-silver appressed pubescence; abdomen and legs with minute golden pubescence. Head and thorax strongly punctured, becoming less dense on thorax, almost obsolete on propodeum; abdomen minutely punctured. Antenna intermediate between rolled and hooked types (fig. 11), last segment about twice as long as broad at base; mandibles five-toothed, the two basal teeth almost indistinguishable; clypeus about as long as broad, with two sharp teeth on either side of angular apical emargination (mandible and clypeus about as in fig. 8). Thorax, as viewed from above, about as long as broad at tegulæ, front margin of pronotum and pronotal angles completely rounded off; mesonotum with notaulices deeply impressed; scutellum convex; propodeum without carinæ setting off enclosure. Second sternite with a faint, almost obsolete, basal median suture; genitalia stout, tips of squamæ bent inward and crossing each other, volsella slender as viewed dorsally but triangular, plate-like, as viewed laterally, ædeagus truncate apically and inflated, with sharp median dorsal ridge and depressed sides (proportions from dorsal view about as in fig. 3). Length to apex of second tergite, 10 mm.

Female. Coloration, pubescence and puncturation as in male with the following exceptions: Clypeus bright orange-red, glabrous except for erect, long, black hair; golden pubescence on abdomen less prominent; third and following sternites without unusually long fulvous pile. Length to apex of second tergite, 11 mm.

Although very close to *margaretellus*, *cinnabarinus* can be separated by its more extensive red coloration, the shorter pubescence, and the less strongly rolled antennæ of the male. It resembles *erythrogaster* in abdominal coloration but the more prominent pronotal angles of the latter are an easy means of differentiation. At present the species is known from Utah, California, Arizona, and Texas.

Holotype, male, allotype, female, and twelve male and four female paratypes, Beaver Creek Hills, Beaver County, Utah, June; one male paratype, Death Valley, California; one female paratype, Santa Catalina Mountains, Arizona (C. D. Duncan); one male paratype, Belton, Texas, April (holotype and allotype donated by J. Bequaert, paratypes from collection of U. S. National Museum and collection of author). Holotype and allotype to be deposited in the California Academy of Sciences, paratypes in the U. S. National Museum, Academy of Natural Sciences at Philadelphia, University of Kansas, collection of J. Bequaert, and collection of the author.